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President of the Hawaiian Sugar Planters' Association for 1902.

The annual meeting of the Hawaiian Sugar Planters' Association will be held at its rooms in Honolulu on Monday and Tuesday, November 17 and 18, 1902.

NEW YORK SUGAR MARKET.—Sept. 26.—Although receipts for the week were 49,600 tons, as weekly meltings continue at 45,000 tons, refiners have been unable to increase their holdings, which appear to be, particularly in New York, very much below the official figures. This, together with Mr. Licht's first published statement, predicting a crop of 5,400,000 tons minimum to 5,900,000 tons maximum, or say a minimum decrease of 980,000 tons, stimulated our market to such an extent that while last week 3½c. would have been accepted for 96° Centrifugals in store, now some holders have raised their views and are unwilling to consider offers below 3 9-16c., while others are firm at 3⅝c.

In spite of this advance, offerings of cane sugars from all sources are very light. Holders of the majority of stocks remaining in Cuba have fully made up their mind to carry their stocks until next year, unless much higher prices are paid. Java, the next source of supply of cane sugars, is firmly holding the unsold sugars at 8s. 7½d., or say very near the parity of 3⅝c. duty paid. There is little or no sugar left in the British West Indies or Porto Rico, while Peruvians are unobtainable at the equivalent of 3⅝c. and Demerara is asking 1⅝c. basis of 96° c. f. for shipment next month.

If meltings continue on the same scale through October it is likely that further purchases of European beets may have to be made, specially for New Orleans, where it will be necessary to keep the refineries well stocked, in order to make them independent of the first sugars of the Louisiana crop. According to late advices the Louisiana crop will only be about 250,000 tons, say 20 per cent smaller than last year.—Czarneke.

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RAWS.—The market sustained the firmness noted last week and gained further strength locally on the improvement which came to the beet markets of Europe by reason of less favorable advices relating to the beet crops there. The weather was reported as too cold, with frost in eGrmany and Austria, and the markets over there responded promptly with an advance for the week from 6s. 11¼d. to 7s. 1¼. for May and 7s. 2¼d. to 7s. 4½d. for August deliveries. At the close, however, our today's cable reports more favorable weather. It is evident that this advance noted was entirely owing to the crop prospects, inasmuch as our sable reports shipments to the United States for the week of only 3,000 tons and no further freight engagements, showing that American refiners have not been in the market to any great extent. The immediate future of our markets depends almost entirely upon the course of the European markets resulting from crop prospects during the next 30 or

60 days, because during that time our domestic crops of Louisiana and Western beet sugars will come heavily on the market and without very strong advices from Europe the trend would not change for the better during the marketing of these crops, but with strong markets in Europe, owing to poorer prospects of their beet crop, the usual decline of prices which comes with the marketing of the United States crops may be avoided to some extent. Prices are on a low level everywhere which, also, is against further decline. Taken altogether it appears as if present prices should be maintained even if no material advance comes to the European market. At the close local markets show great strength with 3½c. for 96° test centrifugals firmly establishes for spot sugars and transactions made for shipment at a cost and freight parity just a shade above this level, say 95° test at 1.81c. c. & f., October shipment, equal to 3.53c for 96° test duty paid.

The European beet crop for the coming campaign is estimated, as reported by cable, at from 5,400,000 tons to 5,900,000 tons. This is presumed to be a preliminary estimate by Mr. Licht, his first regular estimate to follow early in October. Mr. Licht's first estimate of last year's crop was made October 19th and was 6,430,000 tons, with final result as thus far known of 6,880,000 tons.

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There is at present little further to chronicle with regard to the ratification of the Brussels Sugar Convention by the various countries concerned. Only three or four States so far seem to have settled the question. The latest of them is Italy, whose legislative bodies are reported to have accepted the Convention, and to have changed the present sugar law to that effect, which means that instead of taking the difference in color above or below No. 20 D. S., the yield of 94% will probably be the future line of distinction. It is likewise decreed that the inland tax be no longer levied on the juice, but on the consumption of the finished article. As regards England, a recent question in the House of Commons elicited the information that the steps to secure the ratification by the House of the Convention would have to be taken before the conclusion of the session, though not before the conclusion of the present part of the session; which doubtless implies that it will be October ere the bill can be introduced. The same date also is considered the earliest at which the French Legislature will be called on to pass the bill regarding the adhesion of France. From Melbourne comes the announcement that the Australian Federal Government have decided not to adhere to the Brussels Convention.

COFFEE CROP OF GUATEMALA.—The recent earthquakes, which totally destroyed Quenzaltenango, the second city of Guatemala, and many of the neighboring smaller communi-

ties, visited with awful consequences the prosperous coffee plantations of the Republic. While the coffee trees themselves suffered little damage, the dwellings, storehouses, electric installations, coffee machinery, and other improvements on nearly all the estates were more or less seriously injured; and this will necessarily divert attention from the gathering of the coffee crop to the early repairing of the almost universal damage. Before the catastrophe of April 18, indications pointed to a very large output of coffee next season, but I can now say that the yield will not be one-half what was expected. Many things at this time combine to retard even the necessary repairs on the estates.

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SEA ISLAND COTTON.

Among the items of foreign news is the statement that Cuba intends to engage in the cultivation of Sea Island Cotton. There is probably no country better adapted to the cultivation of this staple than Cuba. The principal requisites are a rich soil, warm climate and proximity to sea air, which is supposed to give to the staple a rich gloss with a fineness, delicacy and strength that no other fiber possesses in the same degree. During the southern rebellion in the United States, from 1862 to 1866, the cultivation of this cotton was partially abandoned, and the price rose to one dollar per pound. At that time the writer sent for and obtained several bags of seeds of this plant, and encouraged its cultivation, offering to purchase all the pure sea island cotton that might be raised here; which offer resulted in many bales of fine cotton being shipped to New York, where it sold for fifty, seventy-five and even one dollar per pound. As long as the civil war lasted, the trade in it was very profitable, and many cotton fields were to be seen on each of our islands. The natives eventually became careless as to the seeds which they planted, with the result that short and long staple cotton became mixed, and the product was classed and sold as short staple, at a price which did not pay to export. Another drawback was, the cotton after being tightly baled and remaining so for months, lost its strength and beauty, for manufacturing purposes. As a consequence, the sea island cotton business had to be abandoned. It is only grown profitably along the coast of South Carolina, Georgia and other localities near the sea shore. Some Egyptian cotton closely resembles the American sea island product, but is inferior. If Cuba engages in its production, she may succeed in producing a fair merchantable article, that may in time rival the product of South Carolina and Georgia.

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"CANE SUGAR—and the process of its manufacture in Java" (106 pp.) is the title of a recent up-to-date publication by H. C. Prensen Geerligs, Director of the West Java Sugar Experi-

ment Station, Kagok, Pekalongan. The author is well known as a writer in connection with recent improvements in the manufacture of sugar, and in this manual treats in minute detail of the various processes. The work covers 106 pages, and the present is its second edition. This book will evidently be of value to every sugar boiler. The copy of this new publication which we have was received from the author, who has our thanks for the same.

Molasses for Stock Feed.—The sugar world, at least the United States part of it, is slow to appreciate the great value of molasses for stock feeding. While it has been definitely and frequently stated in Louisiana that a pound of molasses has about as much value for stock feeding as a pound of oats or of corn, still our sugar planters will persist in selling their molasses and buying oats and corn from the western states. We now have advices from Los Alamitos, Cal., to the effect that the stockmen and dairymen in that section of the state are making preparations to lay in a large supply of sugar beet pulp, for their use during the coming year and that one large stock farm, that of Messrs. Fuller & Martin, have demonstrated that the use of molasses, a by-product of beet sugar manufacture, there, is a valuable fat producer in fattening stock for market. Their plan of feeding is simply to have a supply tank on wheels, from which a stream of molasses is poured into the beet pulp feeding troughs, and the cattle seem to relish the addition of the molasses very much and to improve rapidly in condition.—La. Planter.

Importing Insect Pests.—The city or state authorities of California are now very strict in not allowing any plants or trees to land, without close inspection, and many choice plants have been by them confiscated and destroyed. The Mexican orange maggot is one of the worst. Of this one, the inspector said: "That is the one pest that I dread more than all the others put together," and went on to tell about some of his experiences therewith. On the Mexican border there is little trouble, as a close watch is kept and strict quarantine observed, but in San Francisco, with the tremendous amount of sea-going commerce, a keen eye is needed to watch out for the dreaded worm. Only last season a prominent orange shipper purchased a lot of eighteen boxes at Acapulco and, after keeping them in his packing house there for three weeks and carefully inspecting them for the maggot, shipped them to the Hawaiian Islands via San Francisco. Here Mr. Craw pounced on them and they were promptly cremated and Mr. Shipper notified not to do it again. "Why," he said, "I took every precaution and am positive there were no worms in those oranges." "All right," said Craw, "I'll destroy every box you

send up from there, worm or no worm." There haven't been any more brought in by that shipper.—Cal. Cult.

THE DROUGHT IN AUSTRALIA.—Consul-General J. P. Bray, of Melbourne, sends an article clipped from one of the leading pastoral journals of Australia, descriptive of the long and severe drought at present prevailing. The purchasing power of the community, he adds, will be greatly curtailed by the continuance of this drought and the import of American goods consequently affected. The clipping reads, in part: "Unless rain falls soon, the position of the country will become very serious. Australia is suffering more severely than is generally acknowledged from the continuance of the longest and most persistent drought on record. Not for one year, but for several years in succession, has the drought maintained its pitiless hold. In Victoria, the districts north of the dividing range are drought stricken, and the outlook for next year's harvest is omenous. In the back country of New South Wales and Queensland, the condition is much worse. The squatters have seen their stock perish without any hope of saving any but the smallest remnant, and that at an expense which, long continued, is proving an intolerable burden. In the western division of New South Wales, the number of sheep has decreased in ten years more than three-fourths, and the actual monetary loss to individuals is estimated at millions. All through Riverina there is a repetition of similar conditions, varying to some extent in severity according to natural causes, but all adding to the total of injury. In Queensland the pastoral industry is as severely assailed. The districts out west have become a veritable desert, without a blade of grass and with no visible sign of sustenance on which stock may be supported. Yet we are told that though the losses up to the present have been disastrous, they will be as nothing compared to the widespread misery which will result from the continuance of the drought for any length of time."

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A NEW REFINING PROCESS.

The Philadelphia Grocery World gives out the following information regarding a new incorporation company, called the Federal Sugar Refining Company, with a capital of $25,000,000. This company possesses a new process for refining, which, if its description is not exaggerated, will work a revolution in the manufacture of sugar. Bone black is not needed, neither are a number of chemicals which have hitherto been considered indispensable to the manufacture of sugar. Sulphuric acid is the principal ingredient in a cleansing composition which operates directly on the sugar and both whitens and cleans it. One of the objects of the new company is to establish a chain of refineries at various places. Already one plant is about to

begin operations at Yonkers, N. Y., and samples of the sugar made by the new process were to have been shown last Tuesday, but were not. There is a general expectation that the Federal Company will undersell the trust, because its cost of production will be less. A considerable suspicion is growing that the Federal concern is behind the new Philadelphia refinery now going up where the old Pennsylvania sugar house was. This plant expects to start up by October next. * * * The method involves an entirely new mode of refining sugar. It refines all grades of raw sugars which the present refineries cannot handle to advantage. The new process also refines molasses. Under the new process all the sugar comes out as pure white sugar, and none of it as brown sugar or syrup. This new mode can refine sugar under this new process for at least $5 a ton cheaper than under the present process. This saving is due to several causes. First, the Federal Company's plant for refining sugar under the new process is quickly and cheaply built. They claim to be able to build in three months, at an expense of about $750,000, a plant which will refine between 6,000 and 7,000 barrels of sugar a day, whereas a refinery of the same capacity under the present system requires a year and a half in building, and costs over $2,500,000. Second, they get from raw sugar all the saccharine matters there is in it; whereas, under the present refining process, a considerable portion of the pure sugar is lost. For instance, in sugar that contains 96 per cent of pure sugar the present refineries are liable to get only 90 per cent of pure sugar, the remaining 6 per cent of pure sugar being lost in the process of refining. Their labor bill will be only one-half of that involved in the present mode of refining sugar. By the new process refined white sugar is turned out three hours after they start with the raw material; whereas under the present process it requires two weeks to completely refine a batch of raw sugar. The new process consists in the use of a certain composition which has an attraction for all the impurities in sugar and an antipathy to pure sugar itself. It is cheaply and quickly made, and when once made is used over and over again. The mode of using it is very simple.

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GERMAN CARTELS.

A British Consular Report on Germany contains the following remarks on the working of the Cartel system in that country:

The repeated disputes between "Cartels" and syndicates, rings, &c., has compelled the Government to make a stand and to interfere in these matters. First, inquiry is to be made as to the effect of this system of rings and syndicates on the general economic condition of the country. This inquiry will include an examination of the various disputes between rings

and independent manufacturers or owners, and what economic reasons exist, which make the formation of rings desirable. The formulation of laws for the mutual protection of all parties concerned in this modern trade development is also projected.

The Prussian Minister of Commerce has issued an order to all the German presidents to furnish information as quickly as possible as to the "cartels" existing in their respective provinces, and as to their effect on the economic conditions there. Exceptions are made of the kali, coal, coke and raw iron syndicates, presumably, because the Government is sufficiently informed as to the working and effects of these particular institutions.

Among other things the minister wishes to know the number of members in the "cartel"; the number of workmen it employs; the products which are subjected to the conditions of the "cartel" contracts; the amount and worth of the "cartel" products; the reason for its formation; the aim of the "cartel" as to settlement of prices, &c.; the organization of the "cartel," with information as to rules, contracts, and decisions; whether or no it is in connection with foreign rings or syndicates; whether its influence tends to the formation of other "cartels" among either raw material producers or buyers; the influence of the "cartel" on the rise or fall of prices of production or of raw material; the market conditions; whether the "cartel" allows those firms dependent upon it to work in fair competion with other firms. The relation between the home prices demanded by the "cartel" and its export prices; if export premiums are granted, and if so, in what manner, and under what conditions; the fluctuation of exchanges and dividends among the companies and works included in the "cartel"; what measures are taken by the "cartel" to protect it against the independent members of the trade; how is the business intercourse between the "cartel" and buyers and dealers regulated; what provision is made as to damages for firms belonging to the "cartel" in case of limited production or in the event of a total cessation of production; the effect of the "cartel" on the labor and wages of those persons it employs; and what measures are taken by the "cartel" to regulate these conditions; what measures are taken to prevent the formation of trades unions, workmen's organizations, political parties, &c., among the workmen; and what has been the effect of "lock-outs" among the workmen.—Int. Sugar Journal.

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The question of "sugar sweepings" continues to be the subject of numerous discussions, and the U. S. Treasury Department in its decisions has several years since declared that these sweepings "from cargoes of refined sugar are not dutiable as refined sugar, but are dutiable according to polariscope test. Their previous character and condition must be disre-

garded and neither their refinement nor their color considered." There have followed from time to time numerous protests on this question. The late difficulty has reference to two sweepings from two shipments of refined sugar imported from Hamburg. The general appraiser very justly declares that "The merchandise is sugar sweepings and the dirt and refuse contained therein are what give it its character as sweepings. Without the presence of such foreign matter the merchandise would be sugar. * * * It follows that there can be no allowance made for the dirt and refuse intermixed with the sugar, for such foreign substances are as much part of the sweepings as is the sugar itself." These two sweepings were analyzed and the one was found to test 98.2, the other 93.2 by the polariscope. The duty was assessed at the rate applicable to raw sugar.—Sugar Beet.

That sugar is a potent creator of energy and a maintainer of stamina, is not only proved by laboratory experiments but by the date-eating Arabs, the fine health of the sugar cane eating negroes and the results achieved by Alpine climbers, Arctic explorers, athletes and German soldiers who were fed on this special diet. The conclusion is that the increased height and weight and the improved health of the English people in the last half century has been largely due to the increased consumption of sugar.—Ex.

Great Demand for Pineapples.—This industry, says a government bulletin, is developing new life in Florida, despite the threatened competition in the near future from Cuba and Porto Rico, and the plantations are being extended. So great is the demand for new plants and so inadequate the supply that the colonial legislature has just passed an act imposing an export duty on the plants of $1.20 for the first hundred and of $2.40 per hundred for all above that number. Pineapple tops and slips are included in the term plants. An order for 170,000 dozen plants was lately received from Cuba. This act seemed necessary, as the shipments of the plants to Cuba and Florida were becoming very large. The proprietors of canning factories here are much concerned over the apparent intention of our customs authorities to consider all pineapples put up in tin cans, with ever so small a quantity of sugar, as "preserved" fruit, liable to duty at 1 cent per pound and 35 per cent ad valorem. The canned fruit from this colony has heretofore been classified as "fruit in its own juice," and as such has been dutiable at 1 cent per pound and 25 per cent ad valorem. The new ruling, if it prevails, will increase the duty by 10 per cent, and, in the opinion of local packers, will seriously injure their business. Nevertheless, in spite of the uncertainty that prevails on the subject, I think about the usual quantity of fruit will be canned during the present season. The shipping and

canning season covers the three months of May, June, and July.

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CHANGING THE SEED.

There is a common belief that seed necessarily "runs out" and requires a change from one locality to another, from one kind of soil to another every few years. This theory is misleading, and unless the changing of seed is followed intelligently it will be only by accident that the desired end is accomplished. There is abundant evidence to show that varieties of grain crops do not "run out" when they are well cared for. The results from ten years' experiments at the Ontario Agricultural College show that the productiveness of varieties of grain can be improved by selection. The idea that seed is better when introduced from a distant locality is quite contrary to the most reliable evidence. It is true that many of our best varieties have been imported from foreign countries, but it should be remembered that in most cases it was not until they became acclimatized that they showed their superiority. Seed imported from England into Canada generally produces well the first year when sown on the experimental farm at Agassiz, B. C., while on the inland experimental farms the results are usually disappointing for the first two years, or until the variety has become acclimatized; the climate along the Pacific Coast is not very unlike that of England. Extensive experiments have been conducted at the Missouri experiment station to determine the effects of changing seed from one locality to anothr, but without definite results so far.

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One of the most curious details of the awful disaster in Martinique as noted by scientists is the prevision of it which all the animals in the island seem to have had. Cattle became so uneasy that they could hardly be managed, dogs howled continually and showed every symptom of fear, the snakes left the vicinity of the volcano where they abound, and even the birds ceased to sing and left the trees on the mountain side. This was some weeks before the outbreak. Man alone seems to have felt no premonition of the coming death, and so man was the greatest sufferer.

PRESERVED BANANAS.—At Jamaica where bananas are so extensively grown for exportation, there are large numbers of bunches that are rejected and left on the hands of the growers because they are either too small, unripe or over-ripe, or otherwise unsuitable for shipment. It would lead to a valuable enterprise if means were devised for utilizing these bananas and saving them from being thrown away or fed to pigs. Many attempts have been made to manufacture banana meal,

but there are so many attractive and popular competitors amongst cereals and starches that it is doubtful whether banana meal on account of its color, its somewhat low nutritive value, and cost of production will, at any time, enter largely into consumption. Dried bananas have also been tried. They have been most carefully prepared at Jamaica, Montserrat and elsewhere. They have been packed in attractive boxes like figs and offered at a comparatively low price. So far efforts in this direction have invariably failed. In spite of discouragement in the past we are not without hope that means will, eventually, be devised to preserve waste bananas and present them in an attractive form for consumption in temperate countries. There can be no doubt, however, as to the popularity of bananas in the fresh state. The possibilities in this direction are unlimited if only the fruit is presented in really good conditon.

SHADE TREES.—In response to inquiry, we would state that one of the best for the lee side of our islands is the algaroba, the seeds of which were imported during the thirties from Chile, by the pioneer Catholic priests. But seeds of the thornless trees only should be planted, which we can furnish gratis on application. These trees make the best of fuel, while the pods are excellent food for cattle and horses, as well as swine. These trees will grow well only on the lee sides of these islands and not at a higher elevation than two or three hundred feet above sea-level.

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SUGAR CANE RAISED BY TENANTS.

We have recently had an inquiry as to the relative proportion of the cane crop of Louisiana that was produced by the so-called tenant system, says the Louisiana Planter. We presume that the inquirer really meant to inquire how much sugar cane was produced by interests other than those of the factories consuming the cane, whether on the factories' own lands or as actual tenants on lands outside those of the factories concerned and belonging to the cane growers, or under the cane growers' control. While such a designation of sugar cane is incorrect, it is frequently all called tenant cane.

In answering this inquiry we had in mind our frequent articles during recent years in which we have adverted to the fact that the very considerable development of the Louisiana sugar industry was owing to the great increase in the production of sugar cane for sale by cane growers who have come into the business, believing that they could do well in it. These parties have hired lands from the plantations actually engaged in the industry, or have taken their own lands, which have been in rice or other cultures, and begun the production

of sugar cane, which has resulted in our production of at least two crops of sugar of over 300,000 long tons each. Had it not been for the great freeze of 1899 we should have had more of these large crops to our credit.

Without any accurate data from which to arrive at conclusions, we are now led to believe that about one-third of the sugar cane produced in Louisiana is produced by interests other than those of the factories consuming the cane. The industry of growing sugar cane for sale has progressed so largely that we certainly believe that over one-fourth of the sugar cane produced is produced by these can growers purposely to sell to the factories. On the other hand, so much cane is still produced by the large plantations for their own account that we are led to believe that this part of the cane crop exceeds at least one-half of the whole.

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A NEW CANE CUTTER.

There was recently exhibited a new patent cane cutting machine invented by Mr. R. H. Paul. This cane cutter weighs about three pounds, is worked by compressed air supplied by a portable oil engine, compressor, and air receiver. The guttapercha tubing conveying the air has a thickness of half an inch. A chisel, with a 3-inch blade, is fixed at one end, and an iron armpiece joins the end of the hose to the end of a cylinder and a leather strap buckles round the arm and iron alike, and minimizes the slight vibration. It is stated that no matter how great the pressure or air, the cutter remains motionless till pressure is exerted. The cutter in motion emits a harsh gutteral buzzing, and the cylinder vibrates slightly. Canestalk after canestalk was rapidly cut through below the soil. The inventor explained that when he pressed the chisel against the cane it was pushed in about three-quarters of an inch. The compressed air then reached it, and drove it back, and by this means a backward and forward motion was maintained at the rats of thirty to the second. Mr. Paul claims that his machine works with a minimum of physical exertion; that it operates below the ground; that it performs three to four times the amount of work that an ordinary cane cutter can accomplish; and that, being portable, it can be readily carried to any part of the cane field. The spectators were impressed with the utility of the new patent. Mr. Paul submitted his invention to further tests. He cut up the canstalks as they lay on the ground, picked up canestalks, held them at arm's length, and sliced them in half, and cut pieces off. Several of the spectators also operated the machine with apparent success. In order to test the chisel, the side of a wooden box was requisitioned, and the cutter buzzed through readily. Then the blade was turned earthwards, and buried itself in a foot of earth. This experiment was not repeated, however, owing to the cut-

ter coming into contact with some hard substance, probably a stone. The cutter and the hose are estimated to cost £3, and it is claimed that, given a powerful engine, ten cutters may be operated simultaneously. Mr. Paul has advised that a new topping patent will shortly arrive from America. It will consist mainly of a circular disc revolving at a high rate of speed. —Queenslander.

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TELEPHONE SERVICE IN GERMANY.—Under date of July 31, 1902, Consul-General Richard Guenther writes from Frankfort: The telephone service of Germany is carried on by the Post-Office Department. According to an official report, the cost of the entire plant, up to April 1, 1902, amounted to about $42,000,000. Up to April 1, 1901, the cost had been $36,600,000. At the beginning of the present year, 2,024 places had public telephone stations, with 322,281 miles of line. These stations averaged 2,205,966 conversations per day, or about 804,000,000 per year. The following cities have the greatest number of public telephone stations:

	Number.
Berlin	51,561
Hamburg	20,823
Frankfort	9,281
Dresden	8,914
Leipzig	8,725
Cologne	7,484

The total number of employees in this service is 8,189, of which Berlin has 1,712.

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RATOONING IN BARBADOES.

The Agricultural Report says: In recent summaries we have referred frequently to the vexed question of ratoons, and ventured to criticise somewhat adversely the growing tendency to over-ratooning. It would be well, therefore, to impress on our readers abroad, that our remarks apply in no way to judicious and economic ratooning, which in suitable districts is imperatively necessary to the continuance of our sorely harassed industry. Indeed, it is well for us that there are such places as ratooning districts, where soil and climate both lend themselves to this very economical mode of sugar production. But we should not like, as regards this important matter of ratooning, to be misunderstood or to convey anything like an erroneous impression to the minds of interested persons abroad, who may not be conversant with our local conditions. Our remarks were meant to apply only to the non-regular ratooning districts, more or less black soils, in which, as a fact, ratooning has been unwisely and thoughtlessly adopted too freely in recent years, encouraged no doubt by the greater vitality of the transparents as compared with the old Bourbon,

under the driving screw, too, of the "Aids Act" which have tended to force us to agricultural makeshifts. In the non-ratooning districts, the drier and warmer lowlands, ratoons may be grown, and profitably grown, under favorable conditions of variety and season but always with risk of disappointment and of failure which has frequently occurred. But the case is very different in the cool and moist atmosphere of the highlands, where the light red soil makes ratooning not only safe but highly advantageous even up to third crop.

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THE SUGAR INDUSTRY OF PORTO RICO.

R. A. Macfie, in Porto Rico Agricultural Journal.

As Porto Rico coffee and tobacco do not seem to be appreciated as they should be in the United States, and consequently are not salable in that market at the prices which their high quality should secure for them, it is evident that the future prosperity of this beautiful island depends more on its sugar industry than on any of its other productions.

Porto Rico sugar happily finds a ready market in the United States, and prices, which though at present comparatively low, are much higher than can be obtained by either cane or beet sugar producers foreign to the United States.

We have here every favorable element which nature can provide to build up a great cane sugar production.

We have an ideal climate from a sugar planter's point of view. The temperature is such as to secure the maximum production of sugar from the soil. It is never cold enough to check growth or injure the plant, as happens in Louisiana, Florida and more northern latitudes, nor is there the excessive heat, which in countries nearer the equator tends to development of leafy bulk at a sacrifice of saccharine richness.

The normal temperature also admits of manual and animal labor being conducted under much more favorable conditions than is the case in hotter climates.

The greater part of the island is favored with a well distributed rainfall, ample, though not excessive, in quantity. Where the rainfall is deficient, as on the southern side of the island, it has been satisfactorily demonstrated that water for irrigation can be and is being obtained from wells of inexpensive character, much nearer the surface than is the case in Hawaii or other countries that practice irrigation.

We have soil of the chemical composition and mechanical texture best suited to sugar cane, and crops of 80 to 100 tons of cane are actually being obtained in some localities this season.

The broad plains, or vegas, and sheltered valleys lie in such manner as to admit of good drainage simultaneously with easy cultivation and convenient transportation.

There are good harbors advantageously distributed around the island, securing shipping facilities such as no other West Indian island enjoys. Porto Rico is nearer to the eastern American markets than any other sugar- producing country outside of the United States proper.

It costs 60 cents per q. q., and a six week's voyage to convey sugar from the Hawaiian Islands to New York, while it has recently been taken from this island to New York for 10 cents per q. q., and the voyage to that port from San Juan is only of six days' duration. This difference in freight rate, to say noth-i'ng of the time saving, is alone sufficient to give a handsome profit to the producer, all other things being equal.

There is another advantage that Porto Rico enjoys, and perhaps it is the greatest of all, an abundant labor supply. This is all important, for from 40 to 80 per cent of the expenses of a sugar plantation are for labor. No matter how fertile the soil in any country may be, sugar cane cannot be cultivated without a large supply of labor. Few crops, if any, involve so much hand cultivation, and though this may be reduced to some extent by more general employment of animals, there will always be a great deal of work in connection with the crop which can only be done by hand.

We are sure of our labor supply in Porto Rico, because we have a docile population of nearly half a million inhabitants, equal to about 250 per square mile. As the following table shows, other sugar-producing countries are not so highly favored:

Country.	Pop. per square mile.
Jamaica	159
Trinidad	153
Philippine Islands	50
Cuba	37
Hawaiian Islands	22
Peru	7
Demerara (British Guiana)	3

In view of so many advantages, it may be asked why the sugar industry of the island is not more prosperous and more highly developed than is the case.

The reply to this question is that it is attributable to want of modern methods and appliances, and lack of capital to purchase up-to-date machinery and fertilizers, and all that goes to make a first-class establishment.

Starved lands can no more produce heavy crops than a starved horse can bear heavy loads.

A three-roller mill that will break under a pressure of 250 tons cannot extract the amount of juice that a nine-roller mill constructed to withstand a pressure of 500 tons will obtain if properly handled.

Although there are some modern mills doing good work in

Porto Rico, the generality of the older ones are not capable of extracting more than 60 per cent of juice on the weight of cane, and many not even that.

In more advanced countries, by the use of nine-roller mills, from 80 to 84 per cent of juice is obtained, without any increase of operating expenses, and 70 to 78 per cent by six-roller mills and masceration.

Juice that is cooked in cauldrons over fires, or exposed for hours to high temperatures, in antiquated clarifying and evaporating appliances, yields neither the same quantity nor the same quality of sugar that the same juice would do if treated by the Deming system of clarification and concentrated in Lillie evaporators, whereby the duration of these operations is reduced from hours to minutes.

Fuel economy has also to be looked to, and such appliances, boilers and furnaces adopted as have by their use in other countries dispensed with the use of any other fuel besides the bagasse or refuse of the cane, even while admitting of liberal use of "maceration of water" to increase the juice extraction of the mills. There is further, unsurpassed abundant water power on the island which might advantageously be utilized as a motive power.

The sum of all these points of inferiority amounts to this: That the average Porto Rican planter only gets from 6 to 7 per cent of sugar from his cane, and 1½ to 3 tons of sugar per acre, while advanced producers on the Hawaiian Islands are getting 12 to 15 per cent from the cane and 6 to 12 tons of sugar per acre.

Let it not be thought that these comparisons reflect any discredit on the Porto Rican planter, by no means; Porto Rico, till a few months ago, was struggling without any protection in almost hopeless competition with European beet-root sugar, which, by the aid of bounties from the treasuries of French, German and other governments, is sold below the cost of production.

That the sugar industry has survived such competition here better than in any other of the West Indian islands, as has been the case, proves both the natural advantages that exist and the energy and skill of the planters who, with poor appliances, have been able to maintain so unequal a contest.

Happily, a new era has been entered upon and capital judiciously invested in land and up-to-date machinery for the production of sugar may be depended on to give a good return.

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THE RUSSIAN BOUNTY.

In addition to their Diplomatic Note the Russian Government have issued, in the Journal of the Ministery of Finance, a more detailed document on the same subject.

The statement begins by maintaining, as before, that the

measures taken by the Government to regulate the sugar industry, far from encouraging the exportation of sugar, are aimed at removing the incentives to exportation which existed previous to the law of 1895. Then comes a short historical retrospect.

It was in 1885 that the Russian production began to exceed the consumption, naturally causing a fall in value in the home market. To check this, the Government, on 12th July, 1885, granted a bounty of a rouble the poud on the first two million pouds exported. In about three months these two million pouds were got rid of, and as the fall in value was not checked, the bounty was continued till July, 1886. The bounties paid amounted to 2,134,453 roubles in 1885, and 4,642,362 roubles in 1886.

In 1887 a syndicate was formed to compel exportation of surplus production; but its engagements were not loyally carried out. Prices fell again to a low level in 1895, and threatened a fresh crisis. The Government was appealed to for assistance in regulating the industry and compelling the exportation of the over-production.

The Government fixed by law the quantity of sugar which could be annually admitted on to the home market. This normal quantity pays an excise duty of 1r. 75c. per poud. Any sugar appearing on the internal market in excess of this quantity must pay an additional duty of the same amount; that is a total duty of 3r. 50c. per poud. The Government, moreover, fixes for each campaign the maximum price of sugar, and as soon as this price is exceeded the Minister of Finance is authorized to make an additional delivery of sugar for the home market from the reserve stock, which shall pay only the ordinary excise duty. The total quantity of sugar admitted to the home market "is distributed among the factories in conformity with their productive power; but as the factories are situated in various quarters, and as exportation is more advantageous to some, while to others it is more convenient to deliver the sugar to the home consumer, the factories have the right to distribute among themselves the quantity of sugar admitted to the interior market. It is natural that the factories who give up to others their right of delivering sugar for home consumption should receive a certain compensation for the loss of the benefit arising from the sale of sugar on the home market."

Having made this explicit statement, showing that the "benefit arising from the sale of sugar on the home market" is practically a fund enabling the surplus to be exported, the writer endeavors to explain that this is not a bounty to the exporter. He urges that the sale of the right to deliver for home consumption "does not encourage the exportation of sugar and does not contribute towards the throwing of large quantities on to the international market." Perfectly true. It is not the sale of the right which constitutes the bounty. The sale mere-

ly proves the existence of the bounty. And it is the bounty which encourages and even compels increased production; which, in its turn, involves exportation of the surplus.

The writer spoils his own argument by adding: "The sale of export certificates is not a hidden bounty on exportation, but merely represents one of the benefits enjoyed by the factories on the home market owing to its being regulated." In other words, the high price fixed by Government on the home market gives them a bounty on their exports. The profit on the home market is so enormous that even exportation at a heavy loss leaves the manufacturer with a fine profit on his total production. As long as that profit continues fresh competition to participate in it must inevitably go on, followed by a constant increase in the over-production and an ever growing necessity for larger exports. To this stimulus is added that of making the share of each factory in the large profit on home consumption to be in proportion with its total outturn. The factory must produce more every year in order to maintain its former share.

All this was sufficiently well threshed out at the Brussels Conference of 1898. It was there shown by hard and indisputable figures that the profit on the high price fixed for home consumption gave the factories a profit on their total production of between 14 and 15 fr. per 100 k.—about 6s. per cwt. It is clear that production must go on increasing with such a bait, and that 40 per cent can be exported at a loss of a shilling a cwt. without greatly diminishing the attractiveness of the bait.

In the face of such elementary facts it seems extraordinary that the Russian Government should continue its endeavor to throw dust in the eyes not of an ignorant public but of the Governments who have already mastered the subject.—Int. Su. Jour.

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FRUIT, SUGAR, TOBACCO, &C., IN JAMAICA.

From a paper read before the Society of Arts by Mr. H. T. Thomas, twenty-five years resident in Jamaica, we quote:

The products of Jamaica are as numerous and varied as are its climate and degrees of temperature at various altitudes. Its soil is, in most districts, of wonderful fertility; and of it one may truly say that it has only to be tickled with a hoe to make it laugh with a harvest. A great number of those products now rot uselessly on the ground, and still await the touch of capital and enterprise to convert them into sources of wealth. Oranges, golden and luscious, grow wild. Only within the last six or seven years, since their value as an article of export has begun to be more and more realized, has any attempt been made at systematic cultivation, and improvement by budding and other processes. The sour Seville oranges, of whose rind the most delicious marmalade is made, literally

wither on the trees or rot on the ground by millions year by year. The same is true in an even higher degree of the guava, the fruit from which the well-known luscious jelly is prepared. In some districts the tree is positively a noxious weed, and has to be cut down and cleared away by the acres to make room for cultivation of other products.

As a matter of fact, in spite of these circumstances, orange marmalade, manufactured in England or Scotland, and imported into Jamaica, can be purchased at a less price than the manufacture of the home-made article costs; and the same would no doubt be the case with guava jelly, if the latter fruit could be produced at home, as oranges are, from other sources. The cause of this apparent anomaly lies in free trade, which has the effect of making the sugar necessary for these manufactures a more expensive article in Jamaica, where the sugar itself is made, than it is at home. And this brings us by a natural process to the discussion of sugar itself, and its concomitant, rum, which were once the staple of the island, but have now fallen on such evil times, owing entirely to the operations of the free trade principle, as to constitute jointly only 18 per cent of the total value of the exports. The decay of this industry cannot, I think, be more forcibly illustrated than by the statement that, whereas at the beginning of the 19th century there were upwards of 800 sugar estates in cultivation, there are today no more than 121. The famous rum of Jamaica, which is a household word, has been so largely superseded, even in the island itself, by whiskey, that it is now little more than a recollection and a name. There is, however, a particular description of rum which is only manufactured on certain estates in one district of the island, and which, although utterly unfit for human consumption in its natural condition, is much prized in the German market, and is eagerly bought up at prices which appear enormous when compared with those given for the ordinary kinds.

The place once occupied by sugar in the trade of Jamaica has now been completely usurped by fruit: first the banana, and then, a long way after, the orange and the pineapple. In the year 1875 the first load of bananas was taken away from Jamaica to the United States in a small schooner by a Yankee kipper. In 1879 the total value of the fruit exported from Jamaica was estimated at £40,000, while in the return for 1899-1900 it is set down at £814,000. These bare figures describe the growth of the fruit trade more eloquently than any words possibly can do. And this trade is entirely the offspring of American enterprise. The Yankee skipper above-mentioned is now the head of the Jamaica branch of the gigantic concern known as the United Fruit Company, whose headquarters are at Boston, Mass., with offices in New York, Philadelphia, Baltimore, and numerous other places in the States, in Central America, and in the West Indies; notably, since the termina-

tion of the Spanish-American War, in Cuba and Porto Rico. They own hundreds of thousands of acres of land in Jamaica, employ thousands of laborers, and use thousands of head of horses, mules, and cattle. They contribute thousands of pounds to the Inland Revenue and the Customs of Jamaica, over and above what they spend in wages, etc. Besides shipping their own fruit, they purchase millions of bunches from other growers, and in the busy season, which lasts from April to July, they despatch from twelve to fourteen steamers a week laden with fruit. They have laid down tramways, and strung telephone wires round half the island. They have converted the town of Port Antonio from a fishing village into a thriving, bustling, business centre. They have built a fine hotel there, on one of the loveliest spots in the whole island, and they fill it every winter with hundreds of tourists brought down from the States in their own steamers, whose money circulates in the island to the common benefit. They have prevented the eastern and north-eastern districts of the island, where the sugar industry fell into decay more rapidly than in any other part of it, from relapsing into the condition of a primeval African wilderness. In short, if there is one man in the world to whom the grateful inhabitants of Jamaica should erect an imperishable monument, that man is the Yankee skipper who took away that load of bananas in 1875.

The Americans are more a nation of fruit-eaters than the English; and it is to this fact and to their recognition of the actual food value of the banana that the continued increase of the demand for it is due. It is becoming a common article of diet among the working classes; and we hope to see the day before long when its value in this respect will be equally recognized in the mother country.

In this direction a determined and laudable effort was begun last year by a man who has been aptly described as a "Napoleon of commerce." He is now Sir Alfred Lewis Jones, K. C. M. G., the head of the firm of Elder Dempster & Co. He has built a small fleet of four steamers which ply direct between the port of Bristol and Kingston, Jamaica, making the voyage in twelve to thirteen days. By the terms of his contract, he is bound for a period of five years, to purchase in the land a minimum of 20,000 bunches of bananas every fortnight for sale in the United Kingdom. I well remember the interest and anxiety with which the arrival of the "Post Morant," the pioneer vessel of the fleet, was awaited throughout the island in February last, and the crowds which thronged the wharves to watch her progress up the harbor when her approach was signalled. It was felt that the links which bound the ancient British colony to the mother country, neglected and almost rusted through, were now being forged afresh, and that a new era was about to dawn. And I remember how eagerly the telegram was longed for which should announce the arrival of

the ship at Bristol, and the condition of her cargo; and what a wave of relief and rejoicing swept through the island when news of the best was flashed across the wires. Since then the venture has made steady progress, and the fruit trade between Jamaica and England may be regarded as being established on a firm basis. Experience and resolution have corrected the faults and overcome the drawbacks inseparable from the initial stages of such an experiment, and the tide is steadily flowing, never again, let us hope, to ebb.

Not content with exploiting the fruit trade, Sir Alfred Jones has insisted on the advantages of Jamaica as a health and a winter resort—with which I shall deal later on—and has leased from the Government the two principal hotels of the island, placing them under such management that the tourists and invalids whom he conveys thither in his steamers may enjoy to as great a degree as possible the comforts to which they are accustomed at home.

The first-class return far is only £32, and the voyage—in itself a pleasure and a substantial benefit to those in weak health—lasts but from twelve to thirteen days each way.

The principal disadvantage attending the cultivation of the banana is the danger of destruction by gales of wind that would not affect any other description of cultivation. Added to this is the careful handling which the fruit requires to prevent its being rejected by the buyers on account of bruises. On the other hand the profits are enormous and may be calculated at not less than from £9 to £10 per acre per annum. Thus damage by storm or flood can always be amply recouped within twelve months, the period which elapses between the planting of the sucker and the reaping of the mature fruit.

An excellent, nutritious, and easily digestible flower is made from the green fruit; and the development of this branch of the industry only awaits the discovery of some process by which it will be possible to produce the flour so cheaply as to enable it to compete with wheaten flour. When that shall have become an accomplished fact, millions of bunches which are now unmarketable and are thrown away, or given as food for pigs and other stock, will be turned to use and profit.

Pineapples are now receiving great attention in Jamaica. Certain kinds of them bear transport better than any other description of fruit with which I am acquainted. Some fellow-passengers of mine brought over several in May last, simply stowed underneath the berths in the cabin, and on our arrival at Bristol, they looked as if they had been gathered the previous day.

The Jamaica orange is second to none in flavor and juiciness, especially the kind which grows—practically quite wild—in the parish of Manchester. Readers of Mr. Froude's "Bow of Ulysses," will remember his almost rapturous description of the Mandeville orange. The great bulk of this fruit is now

shipped to the United States; and as already stated, it is being systematically cultivated. Experts who have been driven out of the state of Florida—Jamaica's chief rival in the American orange market—by repeated frosts, have migrated to Jamaica and turned their attention to the cultivation and packing of the fruit there. This product is also receiving its due share of attention at the hands of Sir Alfred Jones; and I have been greatly gratified by seeing in the fruiterers' shops in Bedford, Jamaica, oranges which in appearance and flavor leave nothing whatever to be desired.

The cultivation of cocoa has very largely increased of late years. It is now planted, almost as a matter of course, in all the banana fields, where the bananas afford the young plants the shade which is indispensable to them for the first year of their existence. The same soil suits both, and the one cultivation does not interfere with the other in the slightest degree. At the same time the art of curing the cocoa is much better understood than was previously the case, and the Jamaica product is now steadily bridging the great gulf in price that not long since lay between it and the celebrated Trinidad cocoa.

Coffee has shared the fate of most other products, and suffered disastrously in competition with other producing centres of vast extent which are being opened year by year; but the delicate Blue Mountain coffee, which is grown at high altitudes among the mountains, still maintains its reputation for unrivalled flavor, and has not been affected by competition in the same manner as the lower grades.

I am unable to assign any reason for the fact that the excellence of the Jamaica tobacco is not more widely known in the United Kingdom. It is a fact that as good a cigar, of local manufacture, can be purchased in Jamaica for twopence, as would cost at least sixpence in London. The manufactures of the island supply it entirely with cigars, and to a great extent, with cigarettes, manufactured almost exclusively from native grown tobacco, only the outer leaf or "wrapper" being imported; but it does not appear that any attempt has been made to establish export trade on a large scale. The tobacco trade has hitherto been exclusively in the hands of Cubans, who, driven from their own country by constant rebellions and Spanish oppression, have settled in Jamaica, in considerable numbers, most of them becoming naturalized as British subjects. But this industry is now receiving the attention it deserves at the hands of a gentleman who brings to bear upon it not only wealth, but position and influence. He is the Hon. Evelyn Ellis, uncle of the present Lord Howard de Walden, and a large land owner in the western part of the island. He has there established a tobacco plantation which is already the largest, under the control of any one man, in the world. Factories have been erected on the spot, and cigars and cigarettes are being turned out in large quantities. There is also a chem-

ical laboratory in which highly skilled experts experiment with numerous other products that now run to waste. There is not the least doubt that Mr. Ellis's exertions will be of incalculable benefit to the island, especially if he takes up the matter of an export trade in cigars to the mother country. He it was who entirely revolutionized the breeding of cattle for draft purpose in the island by importing stock from India to his magnificent properties of Jamaica, which, crossed with the native breed, make the most ideal draft oxen that can be desired. His herds now practically supply the whole island, and his annual sale is a great event among the sugar planters in the western districts.

Another industry, which has only very recently sprung into existence, and in the future of which I have great faith, is the cultivation of rice. Rice is very largely in use as an article of food among the negroes, and there are thousands of acres of swampy land, utterly useless for any other purpose, which might be profitably turned into rice fields. I myself witnessed the first experiment which was made in the vicinity of the town of Falmouth, on the north side of the island, and can testify both to its success as a commercial venture, and the improvement to the town effected by it from a sanitary and an aesthetic point of view.—Trop. Ag.

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THE INDIAN SUGAR INDUSTRY.

It is generally overlooked that the Indian sugar industry and the interests of the few existing sugar factories and refineries are not necessarily identical. The cultivator is, and for many years to come, must be the backbone of the country.

Of the cultivators who grow sugar cane, what percentage have ever seen, much less dealt with, a sugar factory run on European or similar lines? When the existing countervailing duties were imposed, was there rejoicing in the homes of the ultivator? I most emphatically say that the vast majority of sugar-cane growers in this country are to this day utterly ignorant of the benefits of this particular piece of legislation, ostensibly undertaken on their behalf. Indeed, I go so far as to say that for practical purposes the Indian cultivator is absolutely in different to the effects of bounties, kartels and countervailing duties, and that all these considerations lumped together interest him far less than meteorological conditions which control the prices of grain and enhance the risk and possible loss from a failure of a cane crop, which, be it remembered, is a twelve months' crop; whereas, if a cultivator loses a grain crop, he hopes to make something on the next, It should be borne in mind that, when we hear of the threatened extinction of the Indian sugar industry as the result of bounties, it simply means that the manufacture of sugar on European lines by the few factories of which the country boasts is

likely to become unprofitable: but that this would seriously affect the cultivation of the sugar-cane as it has been carried on from time immemorial, I deny.

Whether beet or refined cane-sugar be sold in the bazaar, the native will still require the indigenous sugar-cane. To the proprietors of the European sugar factories and refiners in India, the case is, of course, entirely different; but in their case the outcry against bounties is made to cover a multitude of sins. I contend that were Indian sugar refineries called upon tomorrow to compete on absolutely fair terms with the Continental beet refineries, they would be worsted in the encounter. To go back to the days before we heard about Continental beet in India. What caused the country to be dotted here and there with the ruins of disused and dismantled sugar factories? Competition for raw material—or injudicious selection of site—either as regards manufacturing facilities, procurement of raw material or markets for finished and by-products. These are the causes that brought many a factory to grief in by-gone days, and these same causes are most acutely felt in more than one Indian factory at the present moment, aggravated in some cases by excessive capital charges due to buying out rival factories, the competition of which for raw material, where the supply was strictly limited, necessitated some such action. Obviously, the limited supply of raw material, in conjunction with the greatly enhanced capital, demands a higher selling price to give a profit. Yet, in spite of past lessons, there are rumors of fresh development in this direction. The new ventures, of which we hear now, are being started to work in conjunction with, or supersession of, indigo in Upper Bengal, will undoubtedly start under more promising auspices than some of the older sugar concerns, their promoters being in a position to profit by mistakes of those who have gone before them.

For instance, it seems hardly credible, but it is a matter of history, that an Indian sugar factory should be started in a neighborhood where there was absolutely no water fit for manufacturing purposes; that another, after many years work, should find cane grown in its vicinity—from a refiner's point of view—the worst cane grown for hundreds of miles round; that another factory started with a great flourish of trumpets, found, after a few months' work, that it could not get sufficient material of a workable kind to keep it going, and had to be practically dismantled and re-erected elsewhere! Want of capital pure and simple has closed the doors of others, but the crux of the the whole question is the scarcity of workable materials. This was plain enough at the time of the passing of the first Countervailing Duties Act. There was a rush for raw material. Mauritius, Penang and Java were all exploited and, by the way came out of the experiment better than India did; The material thence obtained requiring plant and treatment which the Indian factories were not in a position to bring to

bear upon it. However, the purchase of foreign material was scarcely what the Government of India wished to bring about when imposing the countervailing duties.

Originally the sugar factories in India were dependent on cane. Circumstances, however, in most cases, though not all, the increasing difficulty of getting enough cane—led to their falling back during a part of the year on refining from native made raw sugars, of which cane and Palmyra "jaggeries" are the most important. As a general rule the former is so spoiled by the native method of preparation that the refiner cannot afford to pay the price that the cultivator can get for it in the local bazaars for domestic purposes. Where it is produced near enough to a port, it is shipped in considerable quantities for certain uses in Europe where its high glucose content is rather an advantage than otherwise. This, however, does not help the Indian refiner. Much the same applies in the case of the Palmyra jaggery. It also is spoiled in process of manufacture, and it is only in certain districts that the material is produced in a state that allows the sugar refiner to utilize it as a "raw." This means that the supply is limited and that practically there is not enough to go round.

The countervailing duties have undoubtedly brought money into the Government Treasuries, but they have not enabled the refiners to get over the raw material difficulty; and still less have they benefited the cultivators as a body; though they have made them pay a little more for the luxury of refined sugar and sweetmeats made therefrom. The enhanced duties will, no doubt, help the planters and others who are putting down central factories in the midst of large sugar-cane growing areas, but they will not outweigh the heavy cost of transport of cane or inferior raw material in the case of the factories which are unfortunately obliged to go far afield for their supplies, already artificially enhanced in cost by competitive buying.

There is no doubt that the alacrity with which Indian refineries began purchasing and inquiring after foreign raw material after raising the cry of the ruined Indian sugar cultivator was not forgotten by Government when framing the new scale of duties. Hence the disappointment in some quarters with the measure which has now become law.—"The Statesmen."

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COMPARISON OF FUEL VALUES.

Published records of tests of the heating value of petroleum, or "oil" as it is commonly called, indicate that one pound of oil has an average heating value of about 21,000 British thermal units. Four tests were made and the results published on the authority of Favre and Silbermann in the Proceedings Inst. Mech. Engineers, 1899, showing the heat units in two grades of Russian oil, one of petroleum refuse and one of

Pennsylvania crude oil; the average of the four shows 21,180 B. T. U. per pound. Prof. J. E. Denton published an analysis of Beaumont oil that showed a value of 19,060 B. T. U. per pound.

For the purposes of this article a fuel value of 20,000 B. T. U. per pound of oil may be safely assumed.

The representative of one of the oil companies in Honolulu has stated it is proposed to supply this market with oil at an average density of about 16° Baume: this has a Sp. Grav. of .9589 and weighs 7.99 lbs. per gallon. The Beaumont oil has a Sp. Grav. of .920, a density of 22° Baume and weighs 7.66 lbs. per gallon.

Assuming the density of the oil supplied here to lie between 16° and 18° Baume, the average weight will be 7.93 lbs. per gallon and 42 gallons, or a barrel, will weigh 333 lbs.

At the Western Sugar Refinery in San Francisco, the average equivalent evaporation per pound of oil from seven different burners was 11.29 lbs. of water, and the burner giving the best results of 13.85 lbs. water per pound of oil was adopted throughout the plant.

An every day evaporation of 13 lbs. of water per pound of oil involves an efficiency of 65%, and this is not startlingly low considering the comparatively small attention that engineers and firemen in general have given to the question. It is quite likely that when the use of oil as a fuel has received the attention it deserves the efficiency will be brought up to 80%, a figure that is now assumed by some writers.

The heating value of coal lies between 10,000 and 16,000 B. T. U. per pound and depends on the proportions of fixed carbons and volatile matters as well as the combined moisture and ash. The average of a number of trials made in these Islands during the past two years, with hand firing, shows an evaporative effect of slightly over 8.00 lbs. of water per pound of coal. Mechanical stokers gave slightly better result.

These trials were made under more or less expert attention and it would not be safe to assume that 8.00 lbs. of water per pound of coal could be evaporated under every day working conditions. No serious fault should be found with the ordinary Japanese fireman if he is getting an evaporation of 7.50 lbs. per pound of coal in general use here.

Mr. C. F. Eckart, director of the Experimental Station, has kindly furnished the writer with an analysis that is an average or mean of a great many analyses of bagasse. It may, perhaps, be taken as a fair sample of bagasse throughout the Islands, but should not be considered a suitable figure for making final determinations in any particular case. This average analysis is as follows: Sucrose 4.56%, Glucose 1.5%, Fibre 48.66%, Ash 1.5% and Water 43.78%. There are also traces of some gums that are probably hydro-carbons, but of such small quantities they may be disregarded. The chemical analyses

of these component parts are Sucrose C-12, H-22,O-11; Glucose C-6, H-10, O-5; Fibre C-6, H-10, O-5; Water H-2, O-1, and by resolving these with their respective percentages, the fuel value is shown to be 3,500 B. T. U. per pound of bagasse. If all these heat units could be utilized there would be an equivalent evaporation of 3.62 lbs. of water for each pound of bagasse burned. It should be easily within range to burn bagasse with an efficiunits could be utilized there would be an equivalent evaporation of 3.62 lbs. of water for each pound of bagasse burned. It should be easily within range to burn bagasse with an efficiency of 65%; there are boiler settings here that are probably giving better results than this. This will serve, however, to illustrate the point of this article. Burning this average bagasse at 65% efficiency will evaporate 2.35 lbs. water per pound of bagasse, and the following comparisons may now be drawn on the bases laid down:

One pound Bagasse will evaporate 2.35 lbs. water.
One pound Coal will evaporate 7.50 lbs. water.
One pound Oil will evaporate 13.00 lbs. water.

The above shows that as Fuel Values

One pound Bagasse equals .18 pounds Oil.
One pound Bagasse equals .314 pounds Coal.
One pound Coal equals .576 pounds Oil.
One pound Coal equals 3.19 pounds Bagasse.
One pound Oil equals 1.73 pounds Coal.
One pound Oil equals 5.35 pounds Bagasse.

Giving expression to these values in purchase quantities:

One barrel Oil equals .288 tons Coal, or 576 lbs.
One barrel Oil equals .92 tons Bagasse; 1840 lbs.
One ton Coal equals 3.19 tons Bagasse.
One ton Coal equals 3.46 barrels Oil.
One ton Bagasse equals 1.08 barrels Oil.
One ton Bagasse equals .314 tons Coal.

Relative money values in evaporation of water with oil at $1.00 per barrel:

Coal is worth $3.46 per ton of 2,000 lbs. and
Bagasse is worth $0.92 per ton of 2,000 lbs.

The relative money values of coal and bagasse may easily be found as the percentage of actual cost over the assumed price of $1.00 per barrel: For example, if the oil should cost $1.60 delivered to the plantation, it has the same fuel value as coal at $5.54 per ton of 2,000 lbs. and the bagasse has a fuel value of $1.47 per ton.

With coal at $1.00 per ton of 2,000 lbs. oil is worth $0.288 per barrel and bagasse is worth $0.31 per ton of 2,000 lbs. In same manner as above the true result may be obtained by the percentage of true over the assumed cost of coal: Say coal costs $8.50 per ton at the plantation, it has the same value as Oil at $2.45 per barrel and the bagasse is worth $2.63 per ton.

No mention has been made of the comparative costs of

handling the different fuels or the convenience of one over the other; conditions and locality decide these things. This is merely for the purpose of showing a comparison of the fuel value of bagasse with that of coal and of oil, apropos of the recent mention of the use of this "trash" for paper pulp and that these proportions and relative values may afford some data upon which the price of bagasse may be based to return some profit to the plantations.

E. P. JONES,
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AN ATTEMPT TO CHECKMATE TRUSTS.

In her endeavor to retaliate on the Powers and the United States for penalizing her bounty-fed sugar, Russia has initiated a campaign against all trade combinations or trusts. Her first onslaught has not been successful, the Powers and America declining to be parties to any conference convened for the purpose of taking joint action against these great commercial enterprises, and the Russian Foreign Minister, De Witte has retired to formulate some other plan to avenge his country for the supposed wrong which the Brussels Convention will inflict. Trusts are not so easily suppressed as the Czar's Minister imagines; in the past, and not so very long ago, earnest attempts were made to strangle them in their cradle, but without success. Trusts are the natural outcome of the growth of commerce under present conditions. The individual tradesman finds that by taking in a partner he may extend and develop his business; later these partners find that with greater capital they may still further extend their operations and compete more successfully with trade rivals and so a limited liability company is formed; and ultimately it is found that by amalgamation of different concerns in the same line of business, economy is secured, undue competition prevented and greater profits provided. Trusts, as originally formed in America, were governed by trustees who were sworn to maintain secrecy regarding the agency and operations of the businesses which were placed in their hands. It was the duty of the trustees to secure the adhesion of different concerns to the combination without disclosing the fact, and thus it was that businesses which the public thought were openly competing were indeed running in harmony and working for the same interest. This was a vicious principle abhorrent to all accepted ideas of fair trading, and not unnaturally an outcry went forth against it. In 1890 the Legislature of the United States adopted the Sherman Act which made such combinations illegal in so far as it was made compulsory for trusts to declare the nature of their transactions and to publish their accounts. This resulted, not in the abolition of the trusts, but merely a change of their form, and now they flourish as do the limited liability com-

panies of our own colony, under the protection of the legislature and with a fully disclosed purpose. Two views are held by political economists of the effect of trusts. One is that this particular form of commercial activity is, and must necessarily be, injurious to the consumer, to the earner of wages, and to the State; that its main object is to obtain the complete control of the market for the special commodity with which it is concerned, to raise the price of that commodity to such an extent as may be necessary for the satisfaction of the capitalists, and to reduce the wages of the producer by the monopoly of the demand for labor. The other view is that the aggregation of capital and the control of productive energies will necessarily prevent waste which is caused by competition, that the trust is a normal and desirable development of trade activity, that it does not and cannot monopolize the commodity it deals in, and that it is to the interest alike of the State, the consumer, and the producer that its operation should be encouraged, and not opposed. It promotes production by its efficiency, it is in a position to lower prices because it avoids the losses of which competition is frequently the cause, and it conduces to the public advantage because it is governed by the natural laws of trade, and is designed for the production of the best article at the lowest cost. This is the gist of the arguments for and against as set forth before the commission on trusts appointed by the United States Government in 1899, and recently published by one of the principal witnesses then examined, Mr. John R. Dos Passos. It is not easy to see how legislation could be adopted to put a stop to such corporations as the Oil Trust, the Beef Trust, and the Iron and Steel Trust, without interfering with legitimate enterprise, for what corporations have accomplished in that direction, one man with millions at his command, like a Carnegie, or a Rockefeller, or a Morgan could step in and do off his own bat, and there would be no one to say him nay; prohibition to the corporation would also mean prohibition to the individual, and undue restriction of individual liberty in the prosecution of industry and commerce is undesirable from every point of view. The United States has been endeavoring for some time now to get satisfactory legislation on the subject, but has failed, just for the reason we have mentioned, that it is contrary to all ideas of progress to stifle the energies of the capitalist, be that capitalist an individual or a corporation. It is felt that trusts in the long run cannot prove detrimental to the ordinary consumer, as the moment they try to over-reach themselves, they collapse by the operation of the natural laws of trade. What the United States has failed to do in their own country where trusts are rampant, Russia is not likely to accomplish by a European conference. The objection Russia has is not to trusts per se, but to the effect they have in underselling other competitors in the foreign markets. There is this difference to

note between the sugar-bounties and trust combinations—the former have not a shred of commercial enterprise to commend them; the latter are wholly dependent on shrewd business ability and capacity to meet and overcome competition. The Continental sugar industries have benefited for years both by direct and indirect Government bounties, and a special kartel system, which has nothing in common with a trading company, but specially organized to enable the industry to sell sugar at a loss in foreign countries while making a huge profit at home. The commercial trust thrives, it is true, under a high protectionist tariff, but that it is not absolutely dependent on that, is evident from its recent introduction into the United Kingdom. The efforts to suppress these trusts by legislation or by conventions are not likely to be successful, for if smashed in one form they will speedily arise in another, just as they have done already in the United States.

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ELECTRICITY DIRECT FROM COAL.

The latest of the many indefatigable attempts made to obtain electricity direct from coal is that of Hugo Johe, of Chicago. He has obtained the patent on a new battery. In his invention a retort is employed which is surrounded by a cylindrical case containing a battery of four cells. The furnace gases for the retort circulate against the inner side of the cell and case. Partitions of porous coal divide each cell into three sections, containing respectively nitric acid, sulphuric acid and ferric chloride solution. In the nitric acid an electrode is immersed, and in the narrow chloride solution a lead electrode.

The operations are as follows:—A suitable quantity of sulphate of lead is placed in the retort with a quantity of coal nearly sufficient to reduce the sulphate to sulphide, and the mixture is then heated until all of the coal is oxidized. The sulphile is freed from impurities which may have been brought into it by the coal, and is then mixed with sulphate of lead in sufficient quantity to yield metallic lead and sulphur dioxide, which reduction is effected by again applying fuel heat to the retort. The sulphur dioxide passes through a pipe into the largest section of the several cells, reducing the ferric chloride therein to ferrous chloride.

Previous to this the generation of the electric current is started by putting the lead electrodes into the largest section and suitably connecting them with the carbon electrodes. The current may be considered as consisting of two currents, one generated by the action of the ferric chloride of the lead electrode and the other by the action of the nitric acid through the interposed porous walls, and sulphuric acid by means of molecular exchange of ferrous chloride. The flow of sulphur bioxide is so regulated that the sulphuric acid formed is not more than sufficient to decompose the chloride of lead formed

in the battery reaction. The lead in the retort is allowed to flow into a pan, where it is suitably shaped or solidified for an electrode. The sulphate of lead deposited by the battery is allowed to accumulate, and at intervals is drawn off by means of syphons, and the deposit of sulphate of lead electrode removed. The temperature of the battery is regulated so that the nitric acid which enters into the sulphuric section is evaporated, the vapours being passed through a condenser and there condensed again to nitric acid flowing back into the nitric acid sections through a pipe.

This process of distillation, oxidation, and condensation is kept up by regulating the temperature of the battery, and supplying sufficient cooling water to the condenser. Thus oxygen is supplied to the nitric acid, while the generation of electric energy with consumption of oxygen goes on. The E. M. F. of the cell at 100 degrees C. is said to be about 1.75 volts.—Scientific American Supplement.

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THE REED SYSTEM OF TRANSPLANTING.

The following results are obtained by the method adopted by Mr. J. H. Reed, of Riverside. According to his method, vigorous trees are selected in the nursery, and are well watered before removal. The longer branches are but slightly cut back, leaving most of the foliage on. The trees are then lifted with large balls of earth, and are taken directly to the plantation, where holes two feet deep and two and a half feet wide have been prepared, into which they are placed, and the earth is well filled-in around each ball, not firmed, but settled with water, so that the trees will stand at the same height as they did at the nursery. No planting should be done unless there is irrigation water available at the time. After the ground has been soaked for several feet on all sides of the newly-set trees, thorough cultivation should follow, as soon as the land is in a proper condition. Under any system of transplanting this is good practice.

Mr. Reed says further: "A small amount of fertilizer is applied soon after planting, for the young roots to use when they first start out from the balls. A pure bat guano with a high percentage of nitrogen, about three-fourths of a pound to the tree, has been found to give the best results; but any commercial fertilizer rich in nitrogen, or animal fertilizer, if placed properly and kept moist, answers well. It is applied in trenches each side of the ball, at right angles with the irrigation furrows, and reaching to them. They may be made by plowing a deep furrow and deepening with a shovel to ten or twelve inches. The material is carefully distributed and slightly mixed with the earth at the bottom of the furrows; the water from the irrigating furrows keeping this always moist, it is available as soon as reached by the rootlets. This also tends to deep

rooting. Thorough irrigation should follow planting every twelve or fifteen days during the first summer. The whole space between the rows should be thoroughly and deeply wet —not merely a narrow strip on each side of the rows. I have traced roots that have grown during the first summer over six feet from the tree, and these should be well supplied with moisture at all times."

The advantage claimed for the Reed method is that it retains the top of the tree, and makes use of it immediately. This retention of nearly all the leaves and branches enables trees under proper conditions to produce a much more vigorous growth than under the ordinary system of severe pruning, when moved from the nursery. The best of care is essential to success in this method. If trees are to receive poor or only ordinary treatment after being set in the orchard, the common method of severe pruning is best. Mr. Reed himself prunes back any trees that show lack of vigor after being transplanted, watered, and fertilized.

The good start given to trees by the Reed method is shown in their size, vigor, and productiveness for an indefinite time, and it is also claimed that a crop of oranges is obtained, without injury to the trees, one year earlier than if they were planted by the usual method. Trees thus planted (on the Reed system) produced over one hundred boxes of oranges on ten acres, the second year from planting, and one box per tree three years from the time of planting. Ten acres of trees five years old produced 2,500 boxes. There was no appreciable injury done the young trees on account of the early bearing, for they continued to make a sturdy growth while maturing the crop of fruit. Trees planted in the usual way one year before, on adjoining land that is similar in character, although receiving good care from the start, are not now as large as those of Mr. Reed, though apparently thrifty.

This method of transferring trees to the orchard and securing their rapid establishment there, is based upon intelligent selection in the nursery and very careful attention to details after transplanting. Mr. Reed does not claim that he originated the method, but it has not been observed except in his orchard, which furnishes an excellent illustration of its value under proper conditions.—Consular Reports.

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THE TREE-PLANTER'S MISSION.

A striking incident occurred out in mid-Nebraska the other day, and one that should be pondered by every dweller in the unforested lands, East or West. The funeral services of the late J. Sterling Morton were held at the homestead where, in 1855, Mr. Morton and his young wife located their claim. At that time not a semblance of a tree was in sight over the level plain that reached away like the green waters of a quiet

sea. When the neighbors and friends gathered for the sorrowful ceremony, they walked through a forest of tall trees up to the beautiful grounds of the Morton home. In front of the house were towering trees, many of them pines, interspersed with shrubs. On either side stretched the broad acres of apple orchards in full bloom, as fair a sight as one might wish to see, while away toward the town was Morton Park, a rich woodland, the pride of the community.

All this was the work of one man, a man who loved trees and caused more to be planted than any other man in the world. He made of the barren prairie a varied landscape. More than that, he showed to the eager Westerners that there is not only an artistic and an ethical meaning in the tree-planter's mission, but a financial gain as well—a lesson that in the West's present stage of development probably has as strong a bearing as any argument that might be presented. The little claim that he homesteaded was, in the beginning, like those of hundreds of his neighbors. Because of his efforts in beautifying it and in covering its acres with trees it became very valuable, and is today one of the most attractive pieces of country real estate in the West. The father of Arbor Day set before the West a great object lesson. While it was by no means lost on the people of his generation, it was when the passing away of the tree-planter made a complete summary of his life possible that the force of the precept and example was most strikingly brought home to their hearts.

It is not alone to the West that his teachings are applicable, though there they are of most potency. The love of trees needs fostering wherever is a home and a habitation. The almost sacred affection with which certain historic trees are regarded by people of ancient nations is in strange contrast with the ferocity with which Americans slaughter the forests. To be sure, there is today some check being put on the denudation of forest lands, and there is growing up in the towns a healthy sentiment in favor of intelligent and general tree-planting. In several large Western cities, where naturally there is most need of this sentiment, the municipal government is taking a hand in tree-planting. In the hands of experienced foresters the streets are lined with trees of proper variety, and care is taken that they are not distorted out of semblance to nature by indiscriminate and reckless pruning. The result will be that in a few years the avenues of those cities will be delightful vistas of shade and the dwellers therein will reap a positive benefit, not alone in enjoyment and comfort, but in dollars and cents.

Despite the Arbor Day proclamations (which are observed but little nowadays) and the unequivocal examples of advantages attending the sentiment prompting them, the mission of the tree-planter is far from ended. Tens of thousands of school yards, East and West—more largely in the West, however—

are as bare of shade as was Mr. Morton's claim in 1855. For decades the pupils have spent dreary days trying to secure some enjoyment on the sun-beaten playgrounds when they might have rested beneath rustling green branches. It is one of the disgraces of the newer portions of the nation that so little attention is given to the planting of trees on the school grounds. There, if anywhere, it would seem that the appeal would be strongest. Not a park is to be found within reach of the common people and the public buildings stand on treeless ground. Now they are waking up to their loss, but find that to secure land for parks they must go to the far outskirts of the city.

In the new towns of Oklahoma, according to reports made to the Department of the Interior, park ground is set apart. More than that, the contract is let in each municipality to some individual to plant trees, his payment being measured by the number that are alive at the end of five years. "This year," proudly announces one such town, "the trees in the park cast quite a shade."

It is not enough that trees be planted—there must be intelligent selection and culture if best results are to be obtained. Some Western cities have ordered the destruction of certain varieties of trees planted generously by early sttlers. They were originally chosen because they made quick growth and were not easily killed by the climate. With the development of the community their undesirable qualities have made them nuisances and the planting must be done over again, a dozen years or more of effort having been wasted.

It is encouraging to know that the sons of the late Secretary of Agriculture propose to make the Morton claim an arboretum, the first in the prairie region. Some one who knows the West and who knows trees will be in charge, and there, at the homestead of the man whose love for trees was a passion and which is itself an object lesson, will be conducted experiments in tree culture of value to all the West. In this the people of the whole nation will be gainers, for it is a practical examplification of the life-work of a man who gave his best years to the tree-planter's mission. Had Mr. Morton himself had the devising of it he could not have chosen a more fitting monument.

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THE AVERAGE SUGAR CONTENTS OF THE WEST INDIAN CANE.

By A. Urich, Ph.D., F. L. C., Trinidad.

The numerous analyses of sugar canes, in particular of cane juice, published of late by the different experiment stations in the West Indies, seem to demonstrate that the cane is a plant of extraordinarily high sugar contents, containing from 17 to

20 per cent sucrose, thus confirming the statements to be found in most books on sugar manufacture.

This is certainly correct for perfectly mature canes cut in the height of the dry season, as experiment canes invariably are, but it is entirely misleading if accepted as the average composition of the canes such as the factories have to deal with during the course of a whole grinding season extending over a period of three or four, or even five, months. Here we find the average sucrose contents of the cane to exceed rarely 13 per cent, at least in the larger West Indian colonies. It is not often that figures taken from the actual working of the West Indian sugar factories are published, therefore, my observations on the sucrose contents of the cane as found on two large estates in Trinidad during the last 10 years might be of some interest.

Nothing has contributed more to discredit the cane sugar industry than the belief in the extraordinary richness of our raw material, given the fact that even in our best conducted usines the return in commercial sugar rarely exceeds 9 to 10 per cent from the weight of the cane. Even if we substitute cane juice for cane, an average sucrose contents of 17 to 20 per cent is absurdly high. Fifteen per cent might be the correct figure for the juice as worked up during a whole grinding season. This was pointed out already 20 years ago by Bedan and Pellet, who found that in Guadeloupe the juice contained 15.87 per cent sucrose as an average for four years. This would be 13.49 per cent on the cane.

As the sugar contents of the cane are invariably calculated from the value found from the juice, different values will be obtained according as we use the quotient $\frac{90}{100}$ or $\frac{88}{100}$ or $\frac{84}{100}$. The latter quotient was accepted by the Chemical Society of Mauritius, not because their cane contained only 84 per cent and 16 per cent fibre, but because the juice as obtained by a mill of 63 to 72 per cent extraction will always be richer than if the whole of the 88 or 90 per cent juice in the cane could have been extracted. Prinsen Geerligs used the quotient 0.848 for the cane juice of Java, and W. Douglas arrived at a similar figure, viz., 0.8457 for the cane juice of Diamond estate in Demerara, which tallies well with my own experiments in this direction.

Accepting the quotient 0.85, I found that the average sucrose contents of the Bourbon cane ground on two usines was only 13 per cent, equal to 15.3 per cent in the juice, or 1.65 lbs. sucrose per imperial gallon. These are the average values for 10 years.

Each of the two usines in question, situated in the flat lands of Trinidad, has an annual crop of 3,500 to 4,500 tons sugar (vacuum pan sugar), representing from five to seven million

gallons cane juice, which were sampled and analyzed regularly.

In the annexed statement the average composition of the cane juice for the whole crop is given.

Average composition of cane juice on Usine B., 1893-1902—Average for 10 years: 15.41 per cent sucrose, 1.51 per cent glucose, 1.655 lbs. sucrose per gallon, 86.4 purity, 13.10 per cent sucrose in cane.

Average composition of cane juice on Usine C., 1893-1902—Average for 10 years: 15.21 per cent sucrose, 1.42 per cent glucose, 1.643 lbs. sucrose per gallon, 86.6 purity, 12.93 per cent sucrose in cane.

In accordance with modern principles the grinding lasted only from 70 to 90 days (actual grinding days), say from middle of February to the end of May, but in spite of this shortened campaign, the grinding had to start in some years with juice containing less than 1.40 lbs. sucrose per gallon. The best juice noticed was 1.92 lbs., but this happened only in one week during the 10 years. It is true that occasionally two lbs. sucrose per gallon have been found for single days, but never as an average for a whole week since the canes of an acrea of 160 acres and more have to be cut to make up a week's work.

The canes grown in the hilly districts of Trinidad (Naparimas) are considerably richer in sucrose, but are inferior in tonage; still I doubt whether they ever average 1.93 lbs. sucrose per gallon as the cane juice of Antigua. According to Pro. Watts this was the mean composition of four and a half million gallons cane juice, the joint production of 10 estates for the whole season in 1893, a fact that will not have failed to excite the admiration and envy of every sugar planter in Trinidad and Demerara.—Sugar Cane.

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HAWAIIAN FARMS.

An official bulletin has been issued, giving the results of the census made by Mr. A. T. Atkinson and his assistants, of which the following is a synopsis:

On the first of June, 1900, the farms of Hawaii numbered 2,273 and were valued at $60,029,956. Of this amount $3,545,895, or 5.9 per cent, represents the value of buildings and $56,484,061, or 94.1 per cent, the value of land and improvements other than buildings. On the same date the value of farm implements and machinery was $11,484,890, and of live stock, $2,570,142. These values added to that of farms give the total value of farm property $74,084,988, an average agricultural investment per inhabitant of $481.07.

The products derived from domestic animals, poultry and bees, including animals sold and animals slaughtered on farms, are referred to in this bulletin as animal products. The total value of such products, together with the value of all crops, is

termed total value of farm products. This value for the census year was $22,040,731, an average of $143.12 for each inhabitant of the islands. Of the above amount $623,215, or 2.8 per cent, represents the value of animal products, and $21,417,516, or 97.2 per cent, the value of crops, including forest products cut or produced on farms.

Third in size, but first in productiveness per acre, is the Island of Oahu, which has an area of 597.8 square miles. Honolulu, the capital of the territory, and the principal seaport of the group, is located upon the southern coast of this island.

The Island of Hawaii is the largest of the group, and also the most important from an agricultural point of view. It contains 42.0 per cent of the total number of farms in the territory, 67.0 per cent of the total area in farms, 48.4 per cent of all the improved land, and 70.2 per cent of the acreage in pasture. The value of its farm land and improvements, except buildings, constitutes 29.2 per cent of the total for the territory, and that of its live stock, 50.8 per cent of the aggregate live stock value of the territory.

The value of the island's farm products in 1899, constituted 38.8 per cent of the total value of products for the territory, and its expenditures for labor and fertilizers constitute 35.2 per cent and 43.9 per cent, respectively, of the total expenditures for the group.

It surpasses every other island in number of farms, farm area, value of farm property and value of products.

The Island of Oahu has only about one-fifteenth the farm acreage reported for Hawaii, but has over one-half as many farms. This difference is due to the number of small rice, taro and vegetable farms operated in the vicinity of Honolulu. With an area of but little more than one-fourth as much improved land, Oahu produced crops having a value more than half as great as was reported for Hawaii, indicating that its improved area is more intensively cultivated.

The area in square miles of the remaining islands are as follows: Kauai, 595.4; Molokai, 257.8; Lanai, 173.6; Niihau, 104.5, and Kahoolawe, 83.1. Lanai and Niihau are given over almost entirely to grazing, thousands of horses, sheep, goats and cattle feeding upon their grassy levels.

Upon the Island of Molokai is located the government hospital for lepers, established in 1865. This institution is situated upon a tract of about 8,300 acres, occupying a projection on the north shore. Owing to its precipitous heights and the general rocky nature of the surface there is but little farming done on the island. The raising of live stock and the cultivation of taro receive the greatest attention. An attempt was made by the American Sugar Company to establish an extensive plantation in the lowlands along the southern shore has proven a costly and as yet unsuccessful experiment. Many thousands of dollars were expended during 1899 and subsequently in the

prosecution of the enterprise, but the failure to secure an adequate supply of fresh water for irrigation purposes caused the abandonment of the project.

The number of farms in 1900 was 2,273, of which 2,111 or 92.9 per cent, reported buildings. The total area in farms, 2,609,613 acres, comprises 62.4 per cent of the total land surface of the eight principal islands, distributed as follows: 32.8 per cent in pasturage, 17.2 per cent in forest area and 7 per cent in improved land. Considerably less than one-third of the improved land is devoted to crops, so that only about 2 per cent of the total land surface is under cultivation.

The average area of the farms was 1,148 acres. The large holdings of the sugar planters, together with extensive sheep ranches, account for this large average. There are many small agricultural holdings in the islands, however, especially among the farms operated by tenants.

It is probable that the number of farms and also the acreage of farm land have been steadily increasing, as in recent years thousands of acres of pasture land have been utilized for growing sugar cane, and many marshes have been reclaimed for the cultivation of rice.

Some of the larger farms contain great tracts of lava and other waste lands, which were, as a rule, included by the enumerators under the head of forest lands, as they could not properly be classed as improved land or as pasture land. In making comparisons based upon the average land values and productiveness of the different islands, account must be taken of the fact that these waste lands constitute a large percentage of the farm acreage of some islands, while in others they are very inconsiderable in extent. Consideration must be given also, to the relative areas of cheap grazing lands, which are very extensive in some islands and comparatively limited in others.

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HIGH GRADE PINEAPPLE CULTURE—INITIATED AND DEVELOPED AT ORLANDO, FLA.

(From our traveling correspondent.)

It is probable that no place on earth has acquired greater celebrity, on account of the quality of the pineapples that it produces, than Orlando, Florida, and the section of country immediately circumjacent thereto. Prior to 1885, pineapples were grown in various localities in this state in a careless sort of way, in limited quantities and of inferior varieties. The industry, if such it can be called, was subject to all the hazards of unpropitious seasons and the uncertainties, as to profits of an undeveloped market demand for its products. But in that year, Mr. George I. Russel inaugurated the system of growing that delicious fruit for commercial purposes under cover, an

event which, followed as it quickly was by the substitution of the best known varieties for the inferior ones heretofore grown, has completely revolutionized the industry and made of it one of the most fascinating and profitable of human employments. In consequence, whereas, before that time, but few persons attempted to raise pineapples at all, except on a very small scale for home consumption, because of the uncertainty and unprofitableness of the effort, hundreds here and elsewhere in this state are now engaged in the business, who find it irresistably fascinating and gratifyingly remunerative.

It is claimed for this immediate section that there is something in the soil and climate that peculiarly adapts it for the highest development of the pineapple in all the essentials of appearance, size and flavor. But the soil here, a sandy loam, is not unlike that found in many other localities, and the climate is that only that belongs to its parallel of latitude. So, it is probable that the wonderful beauty and excellence of the fruit grown here are due rather to the system of protection, fertilization and cultivation pursued, and to the superior knowledge of the growers and assiduous study of the subject, than to any dominant adaptation of the soil and climate. Be that as it may, the fact remains, and is undisputed, that Orlando is the head center of the fancy pineapple business. Its advantages are: Suitable lands, a well adapted, genial climate, ample transportation facilities and a well organized, watchful growers' protective association.

Speaking of that Fallstaff of fruits, such as is grown here, an enthusiastic writer has said: "The pineapple will win out; it will not go stale on a pallid appetite like a watermelon at Christmas. It is no demitasse of sugar-water, pleasing the Frenchman, or the inocuous pink sap of the melon to the African. It is a fruit of character, which appeals to the Anglo-Saxon, because it offers force to force. It leaves on his tongue the incisive tang lightly veiled under the mellow farewell of old Amontillado. It is a fruit robust but kindly."

There are about 200 acres of covered pineries in this vicinity. The Smooth Cayenne is the variety grown almost exclusively, though the Red Spanish, it is thought by some, may become a popular favorite because smaller and less expensive to the consumer, while in flavor it is but little, if at all, inferior to the larger, more showy and most costly Smooth Cayenne. These are questions of detail which experience, based on experiment, can easily settle. Of pineappie culture as a business, Mr. C. B. Thornton, an experienced and successful grower near the city says: "There is no secret in pineapple raising, though some would like to make it appear so. Good care, proper land, good plants free from disease (of which, however, there is but very little), and a general "keeping in shape" of the pinery, makes it the most profitable business that the writer knows of, that comes out of the ground in fruit growth."

The best soil for the pineapple is a sandy loam. That it requires to be aided by some well selected fertilizer, if the best results are to be attained, is self-evident. Chemical analysis, disclosing as it does, the constituent element of the various products of the soil, renders the judicious selection of an appropriate fertilizer for pineapples an easy matter. The dominant idea should be, that it is not the soil but the plant that is to be fed. If the plant to be produced is properly nourished by the direct supply of appropriate food from extraneous sources, the soil will take care of itself, just as the physical economy of the cow will survive and prosper, notwithstanding the most profuse generation of milk, provided the material for milk making is supplied her in adequate quantities.

PRELIMINARY COST PER ACRE.

Land, $30 to $50 per acre—say	$ 50.00
Shedding (average)	500.00
Slips—10,000—at 3 cts.	300.00
Preparation of land, fertilizing and setting	100.00
Incidentals	50.00
Total	$1,000.00

These figures, furnished the writer by Mr. E. F. Sperry, an experienced grower, and president of the Growers' Protective Association, may, under special conditions, vary somewhat. But they are in the main correct and are a material reduction from those that prevailed when slips were sold all the way from $10 to $30 per hundred.

PLAN OF SHED.

The plants grow to be about three feet high, and are protected from the frost and excessive sun's rays, by sheds. The area to be utilized is enclosed by a board fence, boards set perpendicular, seven or eight feet high. Throughout the enclosed area posts, of even height with the fence, are set at regular distances, and upon these rest three inch strips which are to support a covering of either wooden slats, glass set in sash, or cloth. Within the shed, at appropriate intervals, fire receptacles may be arranged and kept in readiness during the danger season for immediate use. The interval usually observed by growers gives 10,000 plants to the acre, and each plant is expected to furnish one fruit, and five or more suckers or slips, during the season.

YIELD AND RETURNS.

A conservative estimate of the average yield of marketable fruit per acre is 600 crates, containing 16 apples, and weighing about 70 pounds each. Ten thousand plants, each having, say five slips, would aggregate 50,000 slips.

As to the money return, none other than a conjectural estimate could be given. There are so many varying conditions coincident with the marketing of any and all products of the

soil, each attended by such as are peculiar to itself, that even past experience furnishes no unerring guide for the future. As an extensive grower remarked to the writer: "Pineapples have sold at all prices, from less than the freight charges, to six and eight dollars per crate." "But," said he, "two dollars per crate, net, is a conservative expectation for the future." Slips are now selling at from three to five cents—possibly in large quantities they might be bought for less.

The figures given furnish the inquiring investor a conservative basis for calculating the possibilities of high grade pineapple culture in the vicinity or Orlando, Fla. Keeping in mind the statement of Mr. Thornton, quoted above, that "there is no secret in pineapple raising, and that proper land, good plants and a general "keeping in shape" of the pinery make it the most profitable business that he knows of, that comes out of the ground in fruit growing," one who chooses it for an occupation should not be thought to have "gone daft."

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AMERICAN RAILROADS AND COMMERCIAL DEVELOPMENT.

It was a great speech that George H. Daniels, General Passenger Agent of the N. Y. C. & H. R. R. R., made recently before the Chautauqua, N. Y., Assembly. Every trader, big or little, ought to read it, and stow away many of the facts presented, for they tend to enlighten, make better merchants, and stimulate pride of country. A request to Mr. Daniels, with a two-cent stamp, will secure a copy. He said in part:

"One of our great writers said that this is an age of transportation.

"Transportation underlies material prosperity in every department of commerce. Without transportation, commerce would be impossible.

"Those States and nations are rich, powerful, and enlightened, whose transportation facilities are best and most extended. The dying nations are those with little or no transportation facilities.

"It has been said by a great American writer that 'Trade follows the flag.' Recent events have placed our flag upon the islands of the Pacific, directly in the natural track between the Pacific coast of the United States and Japan and China, and as we contemplate our growing commerce with these old nations, we are reminded of the prophetic statement of that seer of his time, Honorable Thomas H. Benton, of Missouri, who, while discussing the building of the Union and Central Pacific Railroads, said, pointing toward the Pacific Ocean, 'There is the East; there is India.'

"One of the reasons for the introduction into other countries of our manufactures and products of all kinds is that Americans have the ability to not only do things well, but to

do them quickly; and this practice, which is now general, has been greatly stimulated by the example set by the railroads.

"As an illustration of the ability of Americans to send our products to foreign countries in competition with the whole world, and to show you how general the use of American products and American methods has become in some of these foreign countries, let me read an item from a recent English publication:

" 'Today many a foreigner sits down to his breakfast made up of a cereal manufactured at Niagara Falls, a beefsteak from Omaha, a slice of bacon from the Mohawk Valley, and his bread, of course, from American wheat, ground at Minneapolis.

" 'On his way to his office, if he lives in London, he can ride in a car built in New York, propelled by electrical machinery manufactured at Schenectady, over a railway constructed by American engineers, and largely of American materials.

" 'On reaching his office, and looking about him, he finds, if it is a modern, up-to-date establishment, this condition: He sits in a revolving chair made in Chicago, before a roll-top desk made in Buffalo; his letters are written on a typewriter made at Ilion, New York; he signs them with a New York fountain pen, and dries them on a blotter sheet from New England; the letter copies are put away in files manufactured in Grand Rapids.

" 'Taking a day for pleasure, he attends the races, and sees the highest stakes won by an American horse, ridden by an American jockey. Looking over his evening paper, he reads of the placing in American shipyards of orders for American style battleships for European as well as Asiatic nations, and learns that the scene of the coronation of the King of England is to be painted by an American artist, and that the forty thousand gold, silver and bronze medals ordered by the command of the King, to commemorate his coronation, are being made in Massachusetts; and that the yacht for the German Emperor was built almost within sight of the City Hall of New York, and that a member of the royal family of Germany crossed the Atlantic to be present at the launching, and that it was christened by the daughter of an American President—and he wonders why it is that Americans are able to outstrip almost every other nation in all kinds of modern achievements; and this wonder grows with each succeeding month.'

"In all the ages of the world transportation has been, as it is today, associated directly with the advancement of the human race.

"It began in the dawn of the world with human burden bearers; then in certain countries, the dog, the burro, or pack mule; in others the horse, the camel, and the elephant; the sailing vessel, the canal boat; the steamship, the stage coach, the horse car, and the railroad.

"I think it will be agreed by all that the steam railroad is the highest type of transportation; and when I tell you that all the money in the world, gold, silver, and paper, would not buy one-third of its railroads, you will get some idea of the vastness of this industry.

"Railroad mileage has steadily grown, until now we have 200,000 miles of steam railway in the United States. These railroads employ over 1,000,000 men, whose wages amount to over $600,000,000 annually. Their capital is over $12,000,000,000, and their earnings last year exceeded $1,500,000,000. They carried more than 600,000,000 passengers last year, and 1,100,000,000 tons of freight.

"It is beyond question that American railroads today furnish the best service in the world, at the lowest rates of fare, at the same time paying their employees very much higher wages than are paid for similar service in any other country on the globe.

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AGRICULTURAL RESOURCES OF THE PHILIPPINES.

By Edward C. Andre, Belgian Consul at Manila.

The whole Philippine archipelago is eminently agricultural in its resources and natural products, and its great wealth comes largely from the soil. Of the 89 millions of acres of tillable soil only one-tenth has been brought under cultivation, leaving a princely domain yet to be utilized for the production of the valuable plants which the islands are noted for in the commerce of the world. In the island of Luzon there are valleys so extensive and fertile that they would make plantations of rice, sugar and tobacco that would be marvels of wealth and productivity to their owners. In other equally large sections the soil and climate are eminently suited to the successful culture of coffee, cocoanuts and the Manila hemp. The wooded hillsides can be turned into cocoanut plantations, after they have been cleared, and they would prove a source of income absolutely certain to their proprietors. Each cocoanut tree gives a yearly income of one dollar.

Every foot of soil in this land of promise can be profitably cultivated. Even the swamps are great natural rice-fields, prepared beforehand for the skilled agriculturist who knows how to turn them to profitable use. While the high valleys are suitable for raising sugar and tobacco, the slopes for coffee and the mountains for cocoanuts, the creeks and rivers of the lowlands, where the salt water enters at high tire, can be made sources of profit by cultivating jabe and nipa. The latter is almost the rival of the cocoanut, and yields nearly the same products. The leaves of nipa are used for thatching and siding of the native houses, the fruits are eaten with relish by all both in the raw state and in the form of jellies, and from the

sap of the trees an alcohol is distilled and the natives brew it also into a kind of beer. Jabe is a swamp plant that thrives in the creeks, and its roots are considered an important article of diet.

There are vast areas of primitive forest land in the Philippines which yield an abundance of precious woods. These should be a big source of revenue to the Government in time, either through the sale of the lands or the timber growing on them. As agriculture must prove the chief source of wealth of the islands, it is to be hoped that the acquisition of the land will be made easy for those desiring to settle on it. By this means prosperity will dawn on the whole archipelago in a comparatively brief period. The exports of $40,000,000 a year in the present condition of the islands should, under a stable and judicious Government, increase in a little while to at least $800,000,000.

Under an intelligent system of agriculture the islands should develop into the richest and most profitable of all the tropical countries. Their products ought also to compare favorably with those of the temperate zones, as there are certain regions in the island of Luzon where the climate is inter-tropical owing to the diversified geological conditions of each separate region. In the course of the centuries the soil has accumulated a rich deposit of organic matter, which fructifies all plants put in it, and with periodical inundations the fertility is annually replenished. But Nature has been more bountiful than man has been industrious. Little has been done to utilize the water supply for power or irrigation, and above all no railroads, highways, or other means of transportation connect these fertile regions with the coast or villages and cities. Private enterprise is waiting to sweep away all of these inconveniences just as soon as the firm hand of a stable and judcious government guarantees peace and protection.

There are natural enemies to the success of agriculture which must be met and overcome. The tempests for instance offer obstacles natural to most tropical islands, and the locusts some years ravage wide areas, ruining partially the crops in the various provinces. The cultivation of coffee has been greatly injured in recent years by an insect that might be controlled under judicious management. Six years ago coffee was a very important product; but it has declined rapidly, especially in the Province of Batangas, where the best was always raised. This decrease was all due to an insect called xyloterus, which penetrated between the bark and wood and destroyed the trees. At the same time the roots of the plants were attacked by a small mushroom. This could have all been remedied by applying lime to the soil, but the people were not progressive enough to know it, and the crop gradually dwindled down to a very small one.

Coffee could be made a profitable crop again in a short time,

especially in the provinces north of Manila, where it has been observed the coffee grows in the wild state with great luxuriance. The plants even attain the size and form of trees. This is particularly true in the mountains and on the plateau of the Provinces of Nueva Vizcaya, Benguet, Lepanto, and Abra. The coffee yields half a crop the second year after planting and a full crop three years after. The plants are so hardy and prolific that good crops can then be gathered every season from forty to fifty years.

The method of managing the coffee and other plantations is on the share system and this proves the most satisfactory to the planter, as it requires little capital. The laborers do not expect their share until the crop has been harvested and sold. Usually half the crop goes to the men and the other half to the planter. Other systems have been adopted, but it has been observed that where the labor is paid in money, the expenses have amounted to just about fifty per cent., one one-half the value of the crop.

The share system is consequently adopted by most of the planters, and nearly all of the Manila hemp is raised in this way. This plant is cultivated in the southern provinces of Luzon, mainly in Albay and those surrounding it; also in the highlands of Leite, Samar, and the north of Mindanao. The hemp is a variety of banana tree, and the fiber is produced by the trunk or stem, which is pulpy and can be stripped off. The stem reaches an average height of ten feet. It requires a considerable amount of moisture, but it will not thrive in swampy land. Land properly cultivated with hemp makes profitable returns to the investor, and it is probably the least troublesome of all the agricultural products. The plants require three years to arrive at cutting maturity when raised from suckers, and four years if raised from seed. The suckers spring up spontaneously and in great abundance after the plants once become established in the soil.

A product of the Philippine Islands not so well known as Manila hemp is a variety of indigo called Indigofera tinctoria. It gives a product superior to the indigo of Hindostan. The plant is from three to five feet in height, and the dark green leaves long and narrow. The coloring matter is found in little cells on the reverse side of the leaves. The seeds of this crop are sown in the month of October after the rainy season, and when spread broadcast over the newly plowed field they are covered with earth. The following month of June or July the plants are ripe for the harvesting. The leaves turn yellow and fall at the slightest gust of wind. The plants are cut off with the bolos about a foot about the ground, and piled in wagons with the greatest care. They are carted to the factory near by, where the coloring matter is extracted. The plants are placed in large vats, where they are treated to a bath of cold water and allowed to remain soaking for twelve hours. When the

liquid shows the proper strength, the plants are carefully removed, and the water churned and agitated with sticks and paddles until numerous small oil cells are broken up, which makes the color turn from a green to a blue. Lime water is then added, and the agitation of the water renewed. The lime causes the indigo to settle at the bottom, and the water on the top is gradually drained off. The indigo is next dried in the sun, and cut into little cubes of from one to three inches square. When thoroughly dried these cubes are packed for shipment.

A second, but inferior, crop grows from the roots of the plants; but as a rule the planters uproot them and put in a crop of something else. The indigo of Bayambong is considered the best, and the culture in this province costs $10 to 25 gantas. The yield of the indigo depends naturally on the quality of the soil. The production of indigo has lost a good deal of its former importance because of adulteration and poor methods of culture.

The product which is the most important on the islands is sugar. Several kinds of sugar cane are cultivated, but the varieties raised on the large scale are the yellow cane of Otahiti, the red cane of Batona, and the lignee. The total sugar produced in the whole archipelago is in the neighborhood of 237,500 tons, valued at something like $15,000,000. The most important cane plantations are found on the island of Negros, and next in importance in this respect is the Province of Pampanga, where the culture of the cane is also carried on very extensively and many beautiful estates exist. Cavite, Batangas and La Laguna also produce large quantities. But in all of these places the industry can be enormously increased. The lack of railroad facilities prevents many provinces from being developed, and on account of this the inhabitants have little by little abandoned the inland plantations for land nearer Manila.

Thus those who desire to undertake the enterprise of sugar culture on a large scale will find land in plenty without a rival in the world. When railroads are once built which will bind together these various provinces, the sugar industry must advance wonderfully, and the value of the now uncultivated lands double and treble in a few short months or years. The value of the best sugar land varies in proportion to the distance from markets and other considerations. In the province of Manila and those surrounding it, and also in the provinces of island of Negros, where the land is rolling and near the harbor, it is valued at from $100 to $150 per acre. In the central part of Negros it declines to $90 and $100 per acre, and in other provinces even much lower. In the new plantations the yield is from 180 to 200 tons of cane per acre, and in some of the older plantations, where the soil is worn out, the yield is from 100 to 160 tons. The uncleared land owned by the Government was valued at about $10 per acre, but it costs $20 to

remove the trees, and $20 more for clearing and plowing. The first harvest from the virgin soil produces almost nothing except molasses, and it is not until the third harvest that the sugar becomes much better. At present it is difficult to induce the natives to sell their land, and they are morally opposed to large proprietors, and it might be difficult in some regions to purchase enough to form an extensive plantation. The sugar estates are generally small, and there are very few which yield more than a thousand tons of sugar. On the island of Negros the sugar is carted to the coast in small wagonettes drawn by "caribous," or native buffaloes, and then loaded on schooners of 60 to 250 tons burden at an average cost of twelve and a half cents per ton. The native buffaloes are in great demand for this reason, and they are valued at $40 to $70 apiece.

It would be impossible to cover the whole field of agriculture in such a productive country in a short article. Rice growing is an important industry that needs development; tobacco under the management of experts, would advance into the front rank; the precious woods are numerous and valuable both for export and home use; the cocoanuts, which even thrive in the salt water, should be made to treble their value, and the cacao, or cocoa beans, are very susceptible to improvement, while nearly all other tropical and semi-tropical fruits and products thrive in more or less abundance.—Cor. Ind.

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HAWAII'S SUGAR INDUSTRY.

Sugar culture began on the Hawaiian Islands over sixty years ago. In 1850 the product of sugar, with the crude wooden and stone horse mills and inferior kettles, was not over one ton per acre. In 1880 the total crop of the Islands was reported at only 30,000 tons. The sugar industry was given a tremendous impetus by the reciprocity treaty with the United States in 1875, by which all raw sugars were admitted free of duty. The industry moved forward by almost "leaps and bounds" after the ratification of this treaty. It was seriously depressed by the passage of the McKinley bill, which permitted raw sugars to be imported free of duty, and gave a bounty upon domestic sugars. It was claimed by some that under the reciprocity treaty the United States ought to have paid the bounty to the Hawaiian planters. It rallied again upon the removal of the bounty and the re-establishment of a duty. Since the adoption of the Dingley bill it has enjoyed a period of unprecedented prosperity. Immense improvements have been made, consisting of up-to-date capacious machinery in the sugar house, steam plows and harrows in the field, enormous pumping plants for irrigation, etc. Annexation, which increased the confidence of the public in the future of the industry, and gave higher values to plantation stock, has also caused a considerable increase in the price of labor, the latter

being the largest factor which enters into the expense of sugar-making. Sugar is cultivated on the islands of Hawaii, Maui, Kauai and Oahu. The table lands surrounding the islands at an elevation of from 20 to 500 feet constitute the chief sugar areas. Nearly every acre adaptable to cane culture on these four islands is under cultivation, and the probability of a much larger extension of the industry is small. In the effort to obtain the large profits now incident to sugar culture, extensive estates have been recently opened, cultivated and irrigated. An experience of two years has proven that on some of them the water of irrigation is too salty for sugar cane, and hence these estates had to be closed and all prospects of growing sugar thereon abandoned. There are about sixty plantations on the islands, which yielded last year 289,544 tons of sugar. These plantations have about 100,000 acres in cane, one-half of which is harvested every year. The yield per acre varies greatly, according to character of the soil, position of the plantation on the island, whether in the rainy or rainless belts, etc. Under irrigation as much as eleven tons per acre has been the average of one plantation. Individual acres have given much higher yields. Upon the rainy side of the islands the yields are less, but so are the expenses, and the net gains from each do not vary much.

There are sixty-eight sugar companies on the islands, of which sixty own their sugar houses and manufacture their cane. These are distributed as follows: Twenty-nine on Hawaii, twelve on Maui, nine on Oahu, and eighteen on Kauai. The sugar produced last year is as follows: Hawaii, 115,224 tons; Maui, 57,347 tons; Oahu, 53,625 tons; Kauai, 63,348 tons; or a total of 289,544 tons.—American Grocer.

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GRAFTED MANGOS.—Attention has been directed to the extreme importance of keeping steadily in view the improvement of tropical fruit trees by budding and grafting. The mango is possibly the most popular, and when of really good quality, the most highly esteemed of tropical fruit. There is no difficulty in propagating the best sorts, and we trust to see the day when budded and grafted mango trees will occupy the place of the thousands of useless mango trees that now cover he land. We are led to these remarks by the receipt from the Curator of the Botanic Garden at St. Vincent, of a delicious grafted mango known as the Peach mango. It is a large, plump fruit, weigh ng 10 to 12 ounces, yellow when ripe, juicy, of a delicate flavor and free from fibre. It well deserves its name of Peach mango.—*Barbadoes Ag. News.*